TOWARDS A SUSTAINABLE DESIGN FOR MATURITY MEASUREMENT MARKETPLACE

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ABSTRACT

In this research-in-progress paper, we propose a solution in form of an IT artefact to address both theoretical and practical challenges faced by maturity model designers. We identify and list out the existing challenges & criticisms of maturity models research through an extensive literature review, followed by semi-structured interviews with four maturity model designers. We also explore different motivations of building a maturity model, and using them further scope the boundaries of our solution.

KEYWORDS

Maturity model, Benchmarking, Design science

1. INTRODUCTION

The debate about rigor and relevance continues to exist in the Information Systems (IS) field ever since its inception [9, 55] and maturity model research is no different. Prior research has identified lack of applying scientific re-search methods in a rigorous manner and has called upon IS researchers to not to create elements of maturity models only from prior normative studies, but also validate them empirically. Considering the multitude of maturity models to increase, both academic and consultancy, researchers using self-assessment surveys would definitely face humongous practical challenges in producing empirically founded and validated maturity models. Recent literature in IS [52, 40, 44, 6, 32] have identified some future trends in the domain of maturity models research, especially the increasing academic and practitioner interests in maturity models [8] across multiple domains like business process management [49], e-government [44], and few others wherein the levels of maturity are well established. [40] rightly questions if this high quantity of maturity model literature translates to high quality. Interestingly the trend is stronger in the development of new maturity models of emerging technologies, also called as entities like web/social media [3, 20], Analytics [15], cloud [51], wherein the levels of maturity can be very uncertain and deemed speculative by the academic audience. [32] questions the maturity of such an entity under maturation, while many others [29, 52] questioning the empirical evidence behind these maturity models as well. In line with this we ask our first research question: *What are the current challenges of IS researchers designing maturity models? How can they be addressed?*

In the process of doing so, we reviewed prior literature on maturity models research, examined models by consultancies and interviewed four designers. During this process observed that maturity models, especially in case of emerging technologies is a super-set of the benchmarking [10] concept. Secondly we also discovered that IS literature on maturity model design has not covered some of the most practical challenges that a design product would face like competition for attention, limited exposure to targeted audience and lack of holistic ecosystem thinking by designers, thus risking the model of remaining unused and deemed irrelevant by practitioners. In this paper, we argue that maturity models developed by researchers with a purpose of benchmarking organizations should not only be designed for rigor, but also making the maturity model attractive and accessible for practitioners use. We further propose a solution in form of an IT artefact. Accordingly, we adopt design science approach for

design and evaluation. We restrict the scope of this artefact to researchers and consultants building a maturity model for a highly innovative and emerging phenomenon, wherein the dominant design and best practises are still being understood. In line with this our second research question is as follows: *What are the design principles of IT artefact that can successfully address some of the challenges?*

The rest of the paper is organised as follows. In section 2 we briefly explain the research method, with section 3 focussing on identifying the motivations to design and use maturity models. The next section highlights the challenges that have not been debated in prior literature. In section 5 we propose design requirements for the IT artefact, discuss the results obtained till now and finally in section 6 state our future research agenda.

2. RESEARCH METHOD

Write Figure 1 shows the research steps taken to undertake this task.

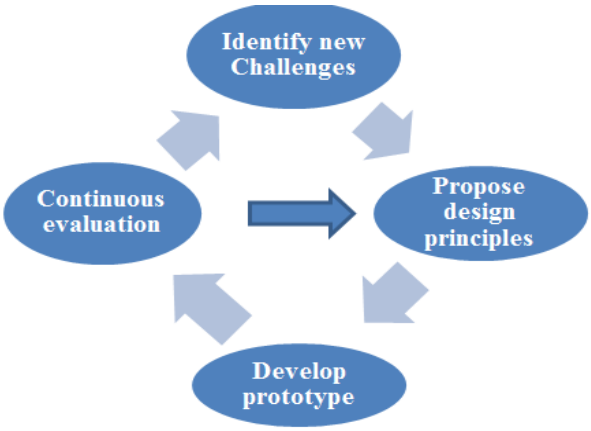

Figure 1. Four iterative research steps.

It comprises of 4 basic iterative steps, starting with identifying the challenges & criticisms of maturity (section 2). This was done through an extensive literature review of maturity models literature in IS, studying practitioner reports and semi-structured interviews with four maturity model designers i.e. two each from academia and consulting respectively (table 1). The next step was to propose design principles to overcome these challenges and develop a working IT artefact, which would be tested by involving the necessary stakeholders (section 3). This artefact is refined iteratively while being validated and improved continuously. The whole process is cyclic and iterative following the design science guidelines.

3. MOTIVATION TO DESIGN AND USE

Recent articles on maturity models by [52], [39] have stated that IS researchers have primarily focused on developing new maturity models, with a majority of them published as conceptual models without an instrument for measurement, thus questioning the relevance of maturity models to practice. Recent papers [29, 52] concluded that there are three identities of maturity models depending on the purpose of use and motivation behind its development.

- The identity portrays them as normative theories e.g. EDP [35],Intranet [14] that are predominantly grounded as process theories.
- The identity portrays them as “best practice guide” or “certification mechanism”, especially post the success of Capability maturity model [36, 37]. E.g. Business process maturity [49, 17], Healthcare analytics certification [23], etc.
- The third and final identity portrays a maturity model as a practical benchmarking tool, wherein organizations are classified and compared against each other using a scale of low to high maturity.

Within the given scope, we found that in majority of the maturity models an entity under maturation could be (1) benchmarked against a pre-defined standard or best practice e.g. e-Government [2, 31] or (2) be subjected to quantitative benchmarking against other organizations, e.g. BI maturity [41], social business maturity [18], etc. With maturity models representing stage-based evolution theories [40] among research community, in practice its application is diverse and lately benchmarking stands very high on the agenda.

In order to understand this better, we thoroughly investigated 12 maturity models with regards to motivation of designers and users as shown in table 1. With benchmarking as a subset we classify 9 out of the 12 models under this category (B, M). Taking inspiration from the categorization scheme [1], we classify maturity models into 6 groups:

Group 1 are models developed mainly by researchers through their own research, are mostly motivated from theoretical aspect, and the model may or may not have been implemented and validated through real life applications.

Group 2 are models developed mainly by academics but as part of an engaged scholarship project [48]. Models are implemented and validated through real life applications.

Table 1. Motivation of Designers & Users.

		Motivations to Design							Motivations of users				
G	SET	Designers	K	B	C	M	L	R	Users (Audience)	B	C	M	I
1	B,M	ITSM self- survey platform* [54]	©	Ᵽ					IS Researchers & IT Practitioners;				©
	~B,M	Social media maturity [25]	©						IS research community. No value for practitioners.				©
2	B,M	E- Government maturity* [2]	Ᵽ	©	Ᵽ				Danish Government organizations & IS research community.	Ᵽ	©	Ᵽ	
	B,M	Process Management Maturity [12]	Ᵽ	©					Hospital Management in Switzerland & the IS research community.	Ᵽ	©	Ᵽ	
3	B,M	Online Analytics Maturity Model* [21]	Ᵽ			©	Ᵽ		Free Online tool for everyone interested in analytics with no clear audience.				©
	B,M	Omni-channel Maturity* [24]		Ᵽ		©	Ᵽ	Ᵽ	Free Online tool for everyone interested in Omni-channel marketing				©
4	B,M	Social Business Maturity [18]	Ᵽ		©	Ᵽ			Decision makers (C suite, Department heads, IT managers).			Ᵽ	©
	B,M	Digital Maturity [53]	Ᵽ		©	Ᵽ			Decision makers (C suite, Department heads, IT managers).			Ᵽ	©
5	B,M	Customer Experience Maturity [38]				©	Ᵽ	Ᵽ	Free Online tool for everyone interested in online marketing.				©
	B,M	Adobe Analytics Maturity [5]				©	Ᵽ		Free Online tool for everyone interested in analytics with no clear audience.				©
6	~B,M	Capability Maturity Model (CMM) [36]	Ᵽ	Ᵽ	©			Ᵽ	Comprehensive tool built for software companies	Ᵽ	©		
	~B,M	CMM Integration [13]	Ᵽ	Ᵽ	Ᵽ			©	Extension of CMM for software companies for certification.	©	Ᵽ	Ᵽ	

© - Core or main motivation; **Ᵽ** - Peripheral or other motivations; **K** – Contribute to knowledge; **B** – Benchmarking (Internal & External); **C** – Drive Change or be a change agent; **M** – Marketing & brand value; **L** – Generating future leads; **R**– Generate revenue; **I** – Other Intrinsic motivations. *Indicates discussion/interview with the main author/designer that respective maturity model.

Group 3 is models developed by mostly consultants from personal opinion and judgment through experience in providing consultancy to organizations. These models may be from an individual capacity, sometimes funded by consultancies which may or may not be embarking on a real project.

Group 4 is models developed by large management consultancies in collaboration with renowned academic and research institutions. From the models analysed by us, we found that driving change or being a change agent was the core motivation of such high profile collaboration. Ideally these models are easily accessible through the internet and are read widely by the practitioners.

Group 5 is models developed by IT vendors, whose main business is selling IT products and services.

Group 6 consists of consortium driven projects and are usually very well planned and executed. They involve consortium of industries, the government and some large educational institutions.

In the model analysed by us CMM [36, 13] has clearly moved from driving change to a full-fledged certification industry generating revenue (R). We also classified some users as those looking for some certification and benchmarking (B) in order to drive an agenda of change (C) within an organisation. Above all, what we found most interesting was the participation of the users'; especially with group 1 & 3 was due to intrinsic motivation (I) – e.g. curiosity, fun, learning, helping a researcher, personal favour or something similar. Moreover, we found that benchmarking in form of a working IT artefact would be a requirement in order to make maturity models relevant especially for group 1, 2 & 3.

4. CHALLENGES AND CRITICISMS

Now that we established the motives, we look towards answering our first research question by identifying the main challenges of maturity models (Table 2) and then classify them into two groups. The first group consists of theoretical and design challenges that have been debated at length in prior IS literature, enough though solutions to solve many of these challenges are still satisfactory.

The theoretical challenges deals mostly with the dilemma on the identity of maturity models and this has debated for last 40 years from [26] to [44]. However, this debate is not purpose of this paper, hence we take a stand that maturity model is well accepted tool, both relevant to practice and research community and move

forward. The design challenges deals with the maturity model design, both the design process [7, 16, 44] as well as design principles for maturity model as a design product [40, 32]. This too has been discussed in detail over the last few years and listed in table 2.

Table 2. Challenges in MM research.

	Type of Challenges	
Already debated extensively	**Theoretical Challenges**	
	Lack of theoretical foundations with models adopting the design structure from Nolan and Gibson [35]and CMMI [13]	[44]
	One size fits all approach & non-acknowledgement of equifinality. Minimal evidence to prove improvements in maturity corresponds to higher benefits.	[27] [34]
	Design Challenges	
	Lack of empirical validation in selection of dimensions, predominantly conceptual.	[28] [31]
	Use of easy to measure, shallow & incomplete measures. Ambiguous interpretation of benchmarking – Explaining the final purpose of use a challenge. Unable to deal with variety, context and continuously changing environment.	[7] [33] [31]
	Developed in Isolation- Lack practical implications. Need for dashboards or similar IT artefact for comparison among respondents.	[54]
Not debated in IS	**Competition for attention**	
	In case of self-assessment, surveys are used as an instrument for benchmarking. The challenge of low response rates & survey fatigue is a huge challenge.	[54], [43] [30]
	Consulting firms are considered to be a central actor in the management fashion arena. Considering maturity measurement as one such fashion, competition for practitioner attention is a challenge for IS researchers.	[8]
	Too many generic maturity models both in the consulting and research world. Need to develop practical advice on selection of maturity models.	e.g. [50]
	Limited exposure to relevant context	
	Lack relationship with the intended audience, no follow up with audience. No reach to relevant practitioner audience, just conceptual models.	[25], [46]
	The time factor has been completed ignored by IS researchers	[20], [19]
	Lack of ecosystem thinking	
	Level of respondent's readiness to participate not looked at. No promotion thus no accessibility & applicability - does not reach practice.	[54], [9], [42]
	Service & support costs of maintaining the maturity instrument to keep the models from being outdated and relevant needs adoption and use in practise.	[10], [31], [13]

It is known that empirically founded maturity models are rare [29]. In order for it to be a common reality, there is need industry participation during the building, testing and validation stage. We use the classic "chicken and egg" analogy here i.e. empirical data for a tool like maturity model would require practitioner participation throughout the process. However except for [32] and [16] none of the procedure models acknowledge the fact it is important to involve stakeholders throughout the process of design and thereafter. We see this as a big research gap and classify them in the second group of challenges (table 2) as follows:

Competition for attention – This addresses the surge in the increasing number of models with fancy reports and artefacts measuring maturity that are easily available via a simple "google search", thus grabbing the time and attention of the practitioners, moulding their opinions before the researcher even decides to reach them.

Limited exposure to relevant context –The time taken by researchers to publish results took around 2 to 3 years' time as compared to their consulting counterparts. E.g. Social media business profile maturity assessment for Irish SME'S took 3 years from the initial conceptual model [20] to the assessment results [19]. The social business maturity assessment [18] on the other hand has published assessment for three years consecutively in the same period.

Lack of ecosystem thinking – Over and above the prior challenges discussed, the value proposition of participation in the whole maturity assessment exercise is not communicated by the researchers to relevant stakeholder throughout the process of development. Except in the case of few engaged scholarship projects, no evidence is seen that effort was put in communicating results beyond academic publications. Moreover, in case of self-assessment using surveys, none of the academic maturity models published look at respondent readiness to participate again.

Addressing the above three challenges would be of utmost importance for IS researchers in order to make the maturity model empirical founded and sustainable. Therefore, in line with the goals of this paper, the next section proposes a solution and subsequently evaluates a novel IT artefact to address these challenges.

5. PROPOSED SOLUTION

In our quest to find a solution for this we align our thinking through design theory [47] and thus consider a kernel theory to guide our solution i.e. theory of platform business [45] to address the lack of ecosystem thinking, limited explore to relevant context and address completion for attention. We further propose a set of design principles, develop and test our IT artefact called "maturity measurement marketplace". We claim that

this IT artefact would be suitable for maturity model designers of group 1, group 2 and group 3. The development of this IT artefact follows a design science approach as it gives a "methodological frame for creating and evaluating innovative IT artefacts" [22, 54]. We formulated the design requirements (req) for our artefact that we plan to adhere to during the entire design process.

Relevance - Req1: Our design should attract independent maturity model designers from group 1, 2 or 3 who would like to use self-assessment survey technique for benchmarking maturity of their targeted audience. Req2: The artefact should also attract and motivate actors in organisations (e.g. managers, CEO's, etc.) to use the artefact and drive change.

Rigor - Req3: The design should have a mechanism to filter and select only relevant actors i.e. both the designers and users. This exercise must involve rigorous analysis on the actor's ability to keep the marketplace credible and relevant as the same time. Req4: Most importantly, the data privacy of users (respondents) must be respected and their assessments protected from misuse at all stages.

Usability - Req5: The artefact should be easy to use and understand, navigation must easy and multi-language support must be provided.

Generalizability – Req6: The maturity model selection and implementation process should be easily mutable across the maturity models and must allow for easy reuse and replicability. Req7: Most importantly, the users (respondents) must be able to navigate and benchmark their maturity across the maturity models hosted on the IT artefact.

Addressing the design requirements (Req1, 2 and 3), we first propose the conceptual model of the artefact as shown in figure 1. In order to satisfy rigor and relevance requirements, the conceptual model has three filters: (i) **Credibility filter** - is the screening process of which maturity model would be allowed. (ii) Intermediary (P) – usually an actor that already has or intends to develop a working relationship with the user. (iii) Catalyst & validity filter – Intermediary acts both as a catalyst by promoting the maturity model and validates the user responses given their business relationship.

Who are these intermediaries? - In our design we consider management & digital consultancies, industry associations and IT Vendors (P). We have three strong reasons for doing so

1. All the three actors are interested in maturity model research.

2. Currently in case of self-assessment tools, there is no mechanism to check if the responses coming in are from respondents actually working for real organisations. E.g. online analytics maturity [21]. The presence of intermediaries would not only ease the process of reaching relevant users, but also make the process of collecting the empirical evidence more rigorous and verifiable.

3. The results from survey research rarely reaches the respondents, even if it does it is in an aggregated level after a long time. Winkler bridges this gap by providing immediate results and feedback to the respondents through their self-survey platform. We go a step further, by not only providing immediate and detailed results, but also an opportunity for the intermediary to get in touch with the users to interpret and study the results obtained.

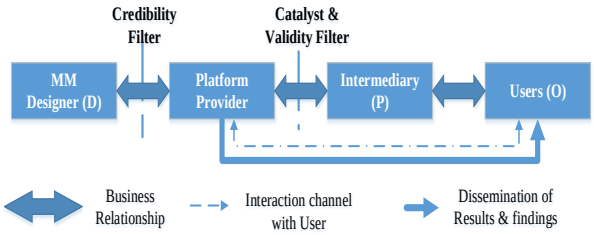

Figure 2. Conceptual design for IT artefact (Maturity measurement marketplace).

The design requirement 3 calls for attracting managers from organisations to adopt the tool. Prior literature on management fashion [4, 30] has positioned management consultants and industry associations are influencers who usually push new knowledge and drive change in the industry. We use this knowledge and in accordance with Req2, design the IT artefact in a way that the relationship of the platform with the end user will always be through the intermediary; however, the user can provide feedback to the IT artefact via an online feature satisfying Req5. This relationship among the actors in the IT artefact is very similar to the well-known supply chain concept of buyer-supplier-supplier triad relationship [11]. As of date, conceptual design for the IT artefact has been adopted and the artefact implemented, with the results and evaluations in table 3.

In addition to feedback via the IT artefact, interviews and talk out loud studies are being conducted with professionals to improve the visualizations, communication and major concerns. One such concern

among users is data privacy. In spite of taking all precautions and continuously evolving our data privacy rules to suit the needs of the users, it still is one of major concerns from recent evaluations. We believe that satisfying Req5, Req6 and Req7 and improving our communication would address the user concerns.

Table 3. Initial results after implementation.

<table>
<tr><th></th><th colspan="2">Digital Maturity score</th><th>Omni-channel Maturity [24]</th><th>DI Productivity index</th></tr>
<tr><td>D</td><td colspan="2">Academics & Consultants</td><td>Consultants</td><td>Association</td></tr>
<tr><td>P</td><td colspan="4">Partners that signed up till now. 90% are consultancies, Associations (2) and vendors (3)</td></tr>
<tr><td rowspan="2">O</td><td colspan="4">Over 900 sign-ups, while the users completing the process has been around 50% (roughly 430)</td></tr>
<tr><td colspan="2">900 (360)*</td><td>700 (350)**</td><td>50 (27)</td></tr>
<tr><td>Status</td><td colspan="2">3 iterations done (17 testers & 44 respondents)
Average time spent on the artefact reduced to 25 minutes from initial 1 hour</td><td>2 iterations done. New visualisation maturity implemented. Collecting user feedback.</td><td>No iterations.</td></tr>
<tr><td>O</td><td rowspan="2">Evaluations</td><td colspan="2">Well done and professional service (+)
Dashboard with survey results looks good, (-)
Sign up and Survey takes too much time (-)
What will you do with the data (-)</td><td>No Feedback yet</td></tr>
<tr><td>P</td><td>How can I interpret these results (-)</td><td>Still analysing feedback collected</td><td>No Feedback yet</td></tr>
</table>

*Total users starting (completed). **There are number of common users for both digital maturity and Omni channel maturity. D – MM Designer. P- Intermediary (Consultancy/Association –One having a working relationship with end user). O – End user(s)

The IT artefact is being developed over last 24 months while taking continuous inputs from intermediaries and users in the process. This evolution of the design and change in features would continue based on future evaluations and we clearly see us moving towards a multisided platform. However, this discussion is not within the scope of this research in progress paper and thus we state our future research plans in the next section.

6. FUTURE RESEARCH AGENDA

Considering the multitude of maturity models to increase [40], both academic and consultancy, researchers using self-assessment survey's would definitely face humongous practical challenges in producing empirically founded and validated maturity models. The completion of this research will produce design guidelines along with a working IT artefact to address the challenges faced by individual maturity model designers working on an emerging phenomenon (group 1, 2, and 3 in table 1). First, we anticipate that successful implementation and adoption of this IT artefact (Maturity measurement marketplace) would provide a set of design principles to build empirically founded maturity models. We also anticipate bridging the gap between academia and industry with regards to maturity models research. We scope our contribution carefully, stating that the above contributions would be relevant to those developing maturity models for the purpose of benchmarking in a domain that is still emerging.

Our initial intention was make a completed research paper, but we believe that the validation of such a tool is not complete with only developing the IT artefact and testing three maturity models for such a short period. Moreover, the maturity models themselves are still undergoing their own validation. Our future research agenda is therefore to validate if the maturity model designers have actually benefited from this IT artefact. From the current numbers the acceptance is visible, but the actual success of a maturity model is proved if it brings about a discussion on improvement among the targeted audience and this would take at least next year or so. During this period, we will host few other models as experiments and evaluate the impact on practise. We will also test the hypothesis that availability of empirical data during development process would produce more rigorous models as compared to theoretically and conceptually grounded models.

7. REFERENCES

[1] G. Anand And R. Kodali, "Benchmarking The Benchmarking Models", Benchmarking: An International Journal, 15 (2008), Pp. 257-291.

[2] K. V. Andersen And H. Z. Henriksen, "E-Government Maturity Models: Extension Of The Layne And Lee Model ", Government Information Quarterly, 23 (2006), Pp. 236-248.

[3] A. Back, Christopher, "Assessing Degrees Of Web-2.0-Ness For Websites: Model And Results For Product Websites In The Pharmaceutical Industry", Bled 2011 Proceedings. Paper 48 (2011).

[4] R. L. Baskerville And M. D. Myers, "Fashion Waves In Information Systems Research And Practice", Management Information Systems Quarterly, 33 (2009), Pp. 647-662.
[5] J. Bates, Is Your Company Healthy? Diagnose With The Data Analytics Maturity Model | Adobe, @Adobemktgcloud, Http://Myanalyticsscore.Com/, 2014.
[6] J. Becker, R. Knackstedt And J. Poeppelbuss, "Developing Maturity Models For It Management – A Procedure Model And Its Application", Business & Information Systems Engineering, 1 (2011), Pp. 213-222.
[7] J. Becker, R. Knackstedt And J. Pöppelbuß, "Developing Maturity Models For It Management", Business & Information Systems Engineering, 1 (2009), Pp. 213-222.
[8] J. Becker, B. Niehaves, J. Poeppelbuss And A. Simons, Maturity Models In Is Research, European Conference On Information Systems (Ecis) 2010 Proceedings, Paper 42, 2010.
[9] I. Benbasat And R. W. Zmud, "Empirical Research In Information Systems: The Practice Of Relevance", Mis Quarterly (1999), Pp. 3-16.
[10] R. C. Camp, Benchmarking: The Search For Industry Best Practices That Lead To Superior Performance, Benchmarking: The Search For Industry Best Practices That Lead To Superior Performance, Asqc/Quality Resources, 1989.
[11] T. Y. Choi And Z. Wu, "Triads In Supply Networks: Theorizing Buyer–Supplier–Supplier Relationships", Journal Of Supply Chain Management, 45 (2009), Pp. 8-25.
[12] A. K. Cleven, R. Winter, F. Wortmann And T. Mettler, "Process Management In Hospitals: An Empirically Grounded Maturity Model", Business Research, 7 (2014), Pp. 191-216.
[13] P. T. Cmmi Cmmi For Development, Version 1.3 (Cmu/Sei-2010-Tr-033). Software Engineering Institute, Carnegie Mellon University, 2010. Http://Resources.Sei.Cmu.Edu/Library/Asset-View.Cfm?Assetid=9661 (Retrieved On 16th Novemeber 2014), Software Engineering Institute, 2010.
[14] J. Damsgaard And R. Scheepers, "Managing The Crises In Intranet Implementation: A Stage Model", Information Systems Journal, 10 (1999), Pp. 131-149.
[15] T. Davenport, H And J. Harris, G., Competing On Analytics: The New Science Of Winning, Harvard Business Press, 2007.
[16] T. De Bruin, R. Freeze, U. Kaulkarni, M. Rosemann, B. Campbell, J. Underwood And D. Bunker, Understanding The Main Phases Of Developing A Maturity Assessment Model, Australasian Chapter Of The Association For Information Systems, 2005.
[17] T. De Bruin, Michaelbartmann, Drajola, Fkallinikos, Javison, Dwinter, Rein-Dor, Pbecker, Jbodendorf, Fweinhardt, C, "Towards A Business Process Management Maturity Model", Australasian Chapter Of The Association For Information Systems (2005).
[18] Delloitte And Mit-Sloan, "Mit Smr's Social Business Interactive Tool 2014", (2015).
[19] A. Duane And P. O'reilly, Social Media Adoption: Stages Of Growth, Paths Of Evolution And Dominant Problems, Proceedings Of The 2nd European Conference On Social Media 2015: Ecsm 2015, Academic Conferences Limited, 2015, Pp. 130.
[20] A. Duane And P. Oreilly, A Conceptual Stages Of Growth Model For Managing An Organization's Social Media Business Profile (Smbp), International Conference On Information Systems (Icis) 2012 Proceedings, 2012.
[21] S. Hamel, The Web Analytics Maturity Model, A Strategic Approach Based On Business Maturity And Critical Success Factors. Last Consulted January, Https://Digitalanalyticsmaturity.Org/, 2009, Pp. 2012.
[22] A. R. Hevner, S. T. March, J. Park And S. Ram, "Design Science In Information Systems Research", Mis Quarterly, 28 (2004), Pp. 75-105.
[23] Himss-Analytics, Delta Powered - Analytics Maturity Suite, Http://App.Himssanalytics.Org/Emram/Delta.Aspx#Dpaa, 2015.
[24] R. Houlind, Hvis Det Handler Om Mig, Sã¥ Kã¸Ber Jeg!, Omnichannel Institute, Http://Omnichannelmarketing.Dk/, 2015.
[25] H. Karkkainen, J. Jussila And J. Lyytikkä, Towards Maturity Modeling Approach For Social Media Adoption In Innovation, 4th Ispim Innovation Symposium, Wellington, New Zealand, 2011.
[26] J. L. King And K. L. Kraemer, "Evolution And Organizational Information Systems: An Assessment Of Nolan's Stage Model", Commun. Acm, 27 (1984), Pp. 466-475.
[27] W. King And T. Teo, "Integration Between Business Planning And Information Systems Planning: Validating A Stage Hypothesis", Decision Sciences, 28 (1997), Pp. 279-308.
[28] G. Lahrmann, F. Marx, T. Mettler, R. Winter And F. Wortmann, Inductive Design Of Maturity Models: Applying The Rasch Algorithm For Design Science Research, Service-Oriented Perspectives In Design

Science Research, Springer Berlin Heidelberg, 2011, Pp. 176-191.
[29] L. A. Lasrado, R. Vatrapu And K. N. Andersen, Maturity Models Development In Is Research: A Literature Review, Iris Selected Papers Of The Information Systems Research Seminar In Scandinavia 2015.Paper 6, 2015.
[30] D. Madsen And K. Slåtten, "The Role Of The Management Fashion Arena In The Cross-National Diffusion Of Management Concepts: The Case Of The Balanced Scorecard In The Scandinavian Countries", Administrative Sciences, 3 (2013), Pp. 110-142.
[31] D. Maheshwari And M. Janssen, "Measurement And Benchmarking Foundations: Providing Support To Organizations In Their Development And Growth Using Dashboards", Government Information Quarterly, 30 (2013), Pp. S83-S93.
[32] T. Mettler, "A Design Science Research Perspective On Maturity Models In Information Systems", Universität St. Gallen, St. Gallen, Switzerland, Technical Report Be Iwi/Hne/03 (2009).
[33] T. Mettler And P. Rohner, Situational Maturity Models As Instrumental Artifacts For Organizational Design, Proceedings Of The 4th International Conference On Design Science Research In Information Systems And Technology, Acm, 2009, Pp. 22.
[34] M. P. W. Mullaly, "If Maturity Is The Answer, Then Exactly What Was The Question?", International Journal Of Managing Projects In Business, 7 (2014), Pp. 169-185.
[35] R. L. Nolan And C. F. Gibson, Managing The Four Stages Of Edp Growth, Harvard Business Review January–February 1974, 1974.
[36] M. Paulk, B. Curtis, M. Chrissis And C. Weber, "Capability Maturity Model, Version 1.1", Ieee Software, 10 (1993), Pp. 18-27.
[37] M. C. Paulk, "Surviving The Quagmire Of Process Models, Integrated Models, And Standards", (2004).
[38] L. B. Petersen, R. Person And C. Nash, Connect: How To Use Data And Experience Marketing To Create Lifetime Customers, John Wiley & Sons, 2014.
[39] J. Pöppelbuß, B. Niehaves, A. Simons And J. Becker, "Maturity Models In Information Systems Research: Literature Search And Analysis", Communications Of The Association For Information Systems, 29 (2011), Pp. 505-532.
[40] J. Pöppelbuß And M. Röglinger, What Makes A Useful Maturity Model? A Framework Of General Design Principles For Maturity Models And Its Demonstration In Business Process Management, Ecis 2011 Proceedings.Paper 28, 2011.
[41] D. Raber, F. Wortmann And R. Winter, "Towards The Measurement Of Business Intelligence Maturity", Ecis 2013 Completed Research. Paper 95. (2013).
[42] M. Rosemann And I. Vessey, "Toward Improving The Relevance Of Information Systems Research To Practice: The Role Of Applicability Checks", Mis Quarterly (2008), Pp. 1-22.
[43] T. Schoenherr, L. M. Ellram And W. L. Tate, "A Note On The Use Of Survey Research Firms To Enable Empirical Data Collection", Journal Of Business Logistics, 36 (2015), Pp. 288-300.
[44] H. Solli-Sæther And P. Gottschalk, "The Modeling Process For Stage Models", Journal Of Organizational Computing And Electronic Commerce, 20 (2010), Pp. 279–293.
[45] K. S. Staykova And J. Damsgaard, A Typology Of Multi-Sided Platforms: The Core And The Periphery, Ecis 2015 Completed Research Papers. Paper 174., 2015.
[46] Z. Thompson And P. Booth, Social Media Within Business: Furthering The Maturity Model, Proceedings Of The 2nd European Conference On Social Media 2015: Ecsm 2015, Academic Conferences Limited, 2015, Pp. 445.
[47] V. Vaishnavi And W. Kuechler, ""Design Science Research In Information Systems". January 20, 2004, Last Updated October 23rd, 2013", Url: Http://Www. Desrist. Org/Design-Researchin-Information-Systems (2004).
[48] A. H. Van De Ven, Engaged Scholarship: A Guide For Organizational And Social Research, Oup Oxford, 2007.
[49] A. Van Looy, An Experiment For Measuring Business Process Maturity With Different Maturity Models, Twenty-Third European Conference On Information Systems (Ecis 2015), Ais Electronic Library (Aisel), 2015, Pp. 1-12.
[50] A. B. Van Looy, Manupoels, Geertsnoeck, Monique, "Choosing The Right Business Process Maturity Model", Information & Management, 50 (2013), Pp. 466-488.
[51] D. Weiss, Jonaszarnekow, Rüdigerand Schroedl, Holger, "Towards A Consumer Cloud Computing Maturity Model - Proposition Of Development Guidelines, Maturity Domains And Maturity Levels", Pacis 2013 Proceedings. Paper 211 (2013).
[52] R. Wendler, "The Maturity Of Maturity Model Research: A Systematic Mapping Study", Information And Software Technology, 54 (2012), Pp. 1317-1339.
[53] G. Westerman, M. Tannou, D. Bonnet, P. Ferraris And A. Mcafee, Digital Transformation - The Digital

Advantage: How Digital Leaders Outperform Their Peers In Every Industry, 2012.
[54] T. Winkler, J. Wulf And W. Brenner, "Selfsurvey: A Prediction-Based Decision Support Platform For Survey Research", Twenty-Third European Conference On Information Systems (Ecis), Münster, Germany, 2015 (2015).
[55] S. Xie, M. Helfert, A. Lugmayr, R. Heimgärtner And A. Holzinger, Influence Of Organizational Culture And Communication On The Successful Implementation Of Information Technology In Hospitals, International Conference On Cross-Cultural Design, Springer, 2013, Pp. 165-174.